B4

3. (Amended) The isolated polynucleotide according to claim 1 comprising SEQ ID NO: 1 in the SEQUENCE LISTING.

REMARKS

The Specification Amendments

Applicants have amended the legend of Figure 4 to correct an informality and to insert reference to the SEQ ID NO: corresponding to the sequence presented therein. Applicants have amended Example 5 to delete the embedded hyperlinks.

None of these amendments adds new matter.

The Claim Amendments

Applicants have amended claims 1-3 to recite that the polynucleotide is isolated and to improve their form. Support for these amendments may be found, for example, on page 8, line 28 to page 9, line 3 of the specification. Applicants have further amended claim 1 to recite "including any polynucleotide encoding an amino acid sequence with at least 80% homology to SEQ ID NO: 2." Support for this amendment may be found, for example, on page 7, lines 12-18 of the specification.

None of these amendments adds new matter. Their entry is requested. Claims 1-3 are pending. Applicants expressly reserve the right to pursue canceled or deleted subject matter in subsequent applications claiming priority herefrom.

Applicants request reconsideration of the above-identified application in view of the foregoing amendments and the following remarks.

The Priority Document

The Office Action Summary indicates that applicants' claim of foreign priority is acknowledged but that none of the certified copies of the priority documents have been received. As required, applicants enclose herewith a certified copy of Japanese patent application 2000-149106.

The Objection to the Specification

The Examiner has objected to the disclosure because it contains an embedded hyperlink and/or other form of browser-executable code. The Examiner states that the applicants are required to delete the embedded hyperlink and/or other form of browser-executable code. As described above, applicants have amended the specification to delete the embedded hyperlinks, thus obviating the objection.

The Examiner also states that the application fails to comply with the requirements of 37 C.F.R. §§ 1.821-1.825 because Figure 4 discloses a sequence that is not properly identified with a sequence identifier. The Examiner states that applicants must amend either the detailed description of the drawings or the drawing to properly identify the sequence. As described above, applicants have amended the legend for Figure 4 on page 5 to identify the sequence, thus obviating the objection.

The Rejections Under 35 U.S.C. § 101

The Examiner has rejected claims 1-3 under 35 U.S.C. § 101 as directed to non-statutory subject matter. Specifically, the Examiner contends that the recitation "polynucleotides encoding" would include polynucleotides as they are present in nature.

As described above, applicants have amended claims 1-3 to recite an isolated polynucleotide as suggested by the Examiner, thus obviating the rejection.

The Examiner has rejected claims 1-3 under 35 U.S.C. § 101 as lacking either a substantial asserted utility or a well established utility. Specifically, the Examiner contends that the specification does not provide evidence that the polypeptide of the invention controls a signal transduction system for brassinosteroid hormone. Applicants traverse.

Contrary to the Examiner's assertion, the instant specification demonstrates a causative relationship between a mutated form of the claimed polynucleotide and an altered response to brassinosteroid hormone. Accordingly, as discussed below, one of ordinary skill in the art would recognize the utility of the claimed invention.

First, the instant specification demonstrates that the claimed gene is expressed in all organs of the plant by Northern analysis (see, e.g., Example 4; page 12, lines 3-9) and describes the presence of sequence motifs in the isolated gene consistent with involvement of the gene in signal transduction. See, e.g., Example 5; page 12, lines 18-29. The instant specification further describes a range of phenotypic

effects associated with brassinosteroid insensitive mutants and indicates that these phenotypes cosegregate with the mutant form of the gene. See, e.g., Example 2; page 10, lines 17-21.

The expression of the gene in all plant organs and the sequence motifs identified through structural analysis combined with the phenotypic effects observed would suggest to one of skill in the art that the gene is involved in signal transduction. Furthermore, experiments described in the instant specification demonstrated a lack of response in strains with a mutation in the gene to a brassinosteroid hormone known to be involved in signal transduction in plants. See, e.g., Example 6; page 13, lines 14-21. These experiments therefore confirmed that the gene is involved in a signal transduction system for brassinosteroid hormone. Thus, provided the disclosure of the instant specification, one of ordinary skill in the art would recognize that a gene comprising the polynucleotide of the invention is involved in the response to brassinosteroid hormone.

Second, the essential role of brassinosteroids in plants was recognized and well established in the art as of the priority date of the present application. Applicants submit herewith two references that demonstrate the well established role of brassinosteroids: Altmann, "Recent Advances in Brassinosteroid Molecular Genetics," Curr. Opin. Plant Biol. 1:378-83 (1998) ("Altmann") and Schumacher & Chory, "Brassinosteroid Signal Transduction: Still Casting the Actors," Curr. Opin. Plant Biol. 3:79-94 (2000) ("Schumacher"). Altmann reviews the elucidation of the *in vivo* biosynthetic pathway of brassinosteroids and discusses the role of

brassinosteroids as essential endogenous regulators of plant growth and development in several plant species. Altmann further argues that scientific understanding of the molecular genetics of brassinosteroid biosynthesis and mode of action will be further enhanced through the availability of molecular tools for the analysis of the biological function of brassinosteroids. Schumacher reviews the genetic and biochemical dissection of brassinosteroid biosynthesis and signaling which have helped to elucidate the pathways of biosynthesis of brassinolide, the most active brassinosteroid. In addition, Schumacher discusses several models for brassinosteroid signal transduction which provide the basic framework for future analysis of brassinosteroid signaling. Thus, these references confirm the utility of the polynucleotides of the invention.

Third, as described in the instant specification, brassinosteroid hormone agricultural chemicals are used to achieve agriculturally useful effects. See, e.g., page 14, lines 7-10. The general use of brassinosteroid hormones as agricultural chemicals further demonstrates the substantial and well established utility of a gene that controls brassinosteroid hormone responses. Thus, contrary to the Examiner's assertion, the claimed invention has both a substantial asserted and well established utility.

The Rejections Under 35 U.S.C. § 112, First Paragraph

The Examiner has rejected claims 1-3 under 35 U.S.C. § and 112, first paragraph, as lacking either a substantial asserted utility or a well established utility.

Specifically, the Examiner contends that the disclosure is insufficient to teach one of skill in the art how to use the invention. Applicants traverse.

As described above, the present invention is useful for controlling a signal transduction system for brassinosteroid hormone. Further, provided the disclosure of the instant specification, the knowledge of those skilled in the art would be sufficient to use the described invention without undue experimentation.

As stated in Example 5 of the specification (see, e.g. page 12, lines 11-31), the utility of the claimed polynucleotide is substantially asserted by the structural analysis. Specifically, in Example 5, database searches were conducted that revealed the presence of nuclear localization signals 1 and 2, and an ATP/GTP binding domain, which support the assertion that the claimed gene is involved in signal transduction.

Further, the specification specifically teaches experimental results of a leaf blade bend response test. In the leaf blade bend response test, the specification demonstrates that "[t]he wild type individuals having the wild type genes showed bending of the leaf blades and leaf sheath junctions (left-hand side in Figures **5A** and **5B**), showing response to brassinolide, whereas mutant individuals showed little bending thereof (right-hand side in Figures **5A** and **5B**), indicating that the destruction of the present gene resulted in the loss of response to brassinosteroid." See, e.g., page 13, lines 8-15. Thus, the present specification clearly shows that the claimed gene is a gene involved in the signal transduction system for brassinosteroid hormone.

As stated in the specification, the claimed polynucleotide may find use in controlling growth promotion, yield increase, quality improvement, maturation enhancement, and tolerance against biotic and abiotic stresses. See, e.g., page 14, lines 2-7. The desired phenotypic trait is a matter of choice for those skilled in the art. Transformation of the claimed gene into a plant of choice is within the skill of one in the art, as is the screening of variants of the claimed gene for increased or decreased activity.

Finally, as discussed above, Altmann and Schumacher confirm that the roles of brassinosteroids in plants were well known and well established in the art as of the priority date of the present application.

Accordingly, applicants submit that Example 6 of the instant specification would convey to one having ordinary skill in the art as of the priority date that there is a well established and asserted utility.

The Examiner has rejected claims 1-3 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in such a way as to reasonably convey to one of skill in the art that the inventors had possession of the invention at the time of filing. Specifically, the Examiner states that the claims do not provide a structural limitation because they allow for an unlimited number of changes to the reference sequence. Applicants traverse in light of the claims as amended.

As described above, applicants have amended claim 1 to recite "including any polynucleotide encoding an amino acid sequence with at least 80% homology to SEQ ID NO: 2." The instant specification describes three separate

algorithms that may be used for comparing sequences and determining the degree of sequence homology between them: the GCG Wisconsin package; the Program Manual for EGCG Package and the ExPASy World Wide Web molecular biology server. See, e.g., page 7, line 31 to page 8, line 7. The instant specification also describes the presence of specific signal transduction sequence motifs in the claimed gene (see, e.g., page 12, lines 18-29) which provides guidance as to where the instant polypeptides and polynucleotides can be modified while still retaining functionality.

Thus, contrary to the Examiner's assertion, amended claim 1 does not allow for an unlimited number of changes to the reference sequence. Rather, the claimed nucleic acid molecules are structurally defined because they are drawn to nucleic acid molecules that have a specified sequence homology to a defined sequence. Thus, the specification provides adequate guidance to reasonably convey to one of skill in the art that the inventors had possession of the invention encompassed by claim 1 and the claims that depend therefrom.

The Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1-3 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Specifically, the Examiner states that the recitations "A polynucleotide encoding a plant gene" and "capable of controlling" are indefinite, that claim 1 appears to have conflicting limitations, and that it is not clear whether the recitation "as represented by" is open or closed claim language.

Applicants have amended claim 1 to recite "An isolated polynucleotide encoding a plant polypeptide which controls," as suggested by the Examiner. Applicants have amended claim 1 to replace "in which one or more amino acids are deleted, substituted or added to the amino acid sequence" with "with at least 80% homology to SEQ ID NO: 2," thus obviating the Examiner's rejection to conflicting limitations in the claim. Finally, applicants have amended claim 1 to replace "as represented by" with "comprising" to clarify that the claim recites open claim language, thus obviating the rejection.

The Rejections Under 35 U.S.C. § 102

The Examiner has rejected claims 1-3 under 35 U.S.C. § 102(a) as anticipated by Sasaki et al., "GenBank™ Accession AP001859, 27 May 2000" or Sasaki et al., "EMBL Accession AP001859, 20 April 2000." The Examiner states that Sasaki et al. refer to a polynucleotide which encodes a polypeptide comprising an amino acid sequence that is identical to SEQ ID NO: 2. The Examiner states that applicants cannot rely on foreign priority papers to overcome this rejection because a translation of these papers has not been made of record in the instant application. Applicants traverse.

First, the sequence described by the Sasaki et al. references is identified only as *Oryza sativa* genomic DNA, chromosome 1. The eighth predicted coding sequence of this sequence, which includes the sequence corresponding to the claimed invention, is described therein only as a "hypothetical protein." This hypothetical

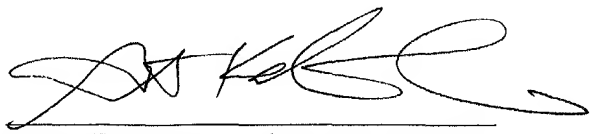
protein is substantially larger than the polypeptide encoded by the polynucleotide of amended claims 1-3. Neither reference provides any evidence that this protein is made in any part of the plant or any evidence of its function. Neither reference discloses any utility for the described sequence or teaches or describes any method of determining a utility for this sequence. Furthermore, these references offer no motivation to search for or expectation of success in identifying the polypeptide encoded by the polynucleotide of the instantly claimed invention. Thus, these references would not enable one of skill in the art to practice the instantly claimed invention and, therefore, these references can not anticipate the present invention.

Second, applicants enclose herewith a certified copy of the priority application of the instant application, Japanese Patent Application No. 2000-149106, which was filed May 19, 2000. Applicants note that Figure 4 and the Sequence Listing of this application, which are in English, correspond to SEQ ID NO: 2 of the instant application. Thus, for this reason as well, the May 27, 2000 Sasaki reference cannot anticipate applicants' invention.

Conclusion

For the reasons presented above, applicants request that the Examiner allow claims 1-3 to issue.

Respectfully submitted,



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Amendments to the specification marked-up pursuant to 37 C.F.R. § 1.121(b)(iii)

Figure 4 shows [an] the amino acid sequence (SEQ ID NO: 2) of the novel rice gene which controls a physiological reaction system induced by brassinosteroid hormone, together with characteristic sequences found therein (where nuclear localization signals and an ATP/GTP binding motif can be observed).

(Example 5: Structural analysis of the causative gene)

Using the sequence obtained according to Example 2 as a probe, the corresponding cDNA and genomic clone were obtained from a cDNA library and a genomic library. Their structures are shown in SEQ ID Nos: 1 and 3. It was learned that this gene includes 6 exons and 5 introns, encoding 1057 amino acids, and that Tos17 had been inserted at the 4th and 5th exons in two mutants, respectively. Moreover, motif search results suggested the presence of nuclear localization signal 1 (amino acid residues 329-367 of SEQ ID NO: 2, Robbins & Dingwall consensus sequence; a search result by PSORT program [(http://psort.ims.u-tokyo.ac.jp/)]) and nuclear localization signal 2 (amino acid residues 457-460, 595-600 of SEQ ID NO: 2, 4 amino acid nuclear localization pattern signal; a search result by PSORT program [(http://psort.ims.u-tokyo.ac.jp/)]) as well as the presence of an ATP/GTP binding domain (amino acid residues 526-533 of SEQ ID NO: 2; a search result by a motif search service on Genomenet[(http://www.genome.ad.jp/)]). Thus, the possibility of this gene being involved in signal transduction was suggested (Figure 4).

Amendments to the claims marked-up pursuant to 37 C.F.R. § 1.121(c)(1)(ii)

1. (Amended) [A] An isolated polynucleotide encoding a plant [gene capable of controlling] polypeptide which controls a signal transduction system for brassinosteroid hormone, the polynucleotide encoding an amino acid sequence from Met at position 1 to Arg at position 1057 of SEQ ID NO: 2 in the SEQUENCE LISTING, including any polynucleotide encoding an amino acid sequence [in which one or more amino acids are deleted, substituted or added to the amino acid sequence] with at least 80% homology to SEQ ID NO: 2.

2. (Amended) [A] The isolated polynucleotide according to claim 1 derived from rice.

3. (Amended) [A] The isolated polynucleotide according to claim 1 [as represented by] comprising SEQ ID NO: 1 in the SEQUENCE LISTING.